

## CLAIMS

We claim:

1. A medical device for applying energy to tissue, the medical device comprising:
  - an elongate member having a proximal portion and a distal portion;
  - a transducer assembly comprising
    - a covering having a proximal and distal end,
    - at least one transducer having at least a first and second pole,
    - a first conductive medium in contact with said first pole of said transducer and extending to at least a portion of an outer surface of said covering,
    - wherein said transducer assembly is located towards a distal end of said elongate member distal portion;
    - at least two conducting members extending through at least a portion of said elongate member, at least a first of said conducting members being electrically coupled to said first conductive medium, and a second of said conducting members extending through said proximal end of said covering and electrically coupled to said second pole of said transducer; and
    - a hollow conductive member located at a distal end of said outer sheath, said hollow conductive tube electrically coupled to a energy source.
2. The medical device of claim 1, further comprising a tip located at a distal end of said elongate member distal portion and having a front and back surface, said back surface being in acoustical communication with said transducer such that said tip is adapted to communicate a source signal from said transducer out through said front surface, said tip also being adapted to communicate a reflected signal from said front surface to said transducer assembly.

3. The medical device of claim 2, wherein said tip comprises a methylpentene copolymer.

4. The medical device of claim 2, further comprising a retaining epoxy placed adjacent to said tip to assist in retaining said tip to the device.

5. The medical device of claim 2, wherein said front surface of said tip is round.

6. The medical device of claim 2, wherein said front surface of said tip is flat.

7. The medical device of claim 2, wherein said front surface of said tip is concave.

8. The medical device of claim 2, further comprising a retaining epoxy placed adjacent to said tip to assist in retaining said tip to the device.

9. The medical device of claim 8, wherein a surface of said tip adjacent to said elongate member contains at least one groove, wherein said retaining epoxy fills said groove to increase retention of said tip.

10. The medical device of claim 8, wherein said retaining epoxy is located at least between said tip and said transducer.

11. The medical device of claim 1, wherein said elongate member comprises an insulating material.

12. The medical device of claim 1, further comprising an insulating layer over a portion of said elongate member.

13. The medical device of claim 1, further comprising an outer sheath having a proximal and distal ends and a lumen extending therethrough, wherein said elongate member is located within said sheath lumen.

14. The medical device of claim 1, wherein said hollow conductive member is coupled to said energy source via a third conducting member.

15. The medical device of claim 14, wherein said energy source is an RF energy source.

16. The medical device of claim 1, wherein said hollow conductive member comprises a material selected from the group consisting of stainless steel, titanium, and aluminum.

17. The medical device of claim 1, wherein said hollow conductive member includes at least one slot and wherein a portion said outer sheath member is retained within said at least one slot.

18. The medical device of claim 1, wherein said first and second conducting members are electrically coupled to a control unit to recognize measure the Doppler shift between the transmitted and received signals.

19. The medical device of claim 1, said transducer is a piezo-electric ultrasound transducer.

20. The medical device of claim 1, wherein said covering comprises a first tube.

21. The medical device of claim 20, wherein said first tube is conductive.

22. The medical device of claim 1, wherein said transducer assembly further comprises a second tube placed within said covering and having an end placed adjacent to said transducer.

23. The medical device of claim 22, wherein said second tube is conductive and where said second conducting member is electrically coupled to said second tube.

24. The medical device of claim 1, further comprising a non-conductive epoxy within said covering, said non-conductive epoxy securing a portion of said second conducting member within said covering.

25. The medical device of claim 24, wherein a portion of said transducer is separated from said non-conductive epoxy by a gap.

26. The medical device of claim 24, further comprising a conductive epoxy at a proximal end of said transducer assembly, said conductive epoxy electrically coupling said first conducting member with said first conductive medium.

27. The medical device of claim 1, wherein said hollow conductive member is fixed in position relative to said transducer assembly.

28. The medical device of claim 1, wherein said hollow conductive member is slidable relative to said transducer assembly.

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29. A medical device for detecting Doppler shift and for applying energy to tissue, the medical device comprising:

an elongate member having a proximal portion and a distal portion;

a transducer assembly comprising

at least one transducer having at least a first and second pole,

a first conductive medium in contact with said first pole of said transducer,

wherein at least a portion of said transducer assembly is located towards said distal portion of said elongate member;

a tip having a back surface being in acoustical communication with said transducer such that said transducer is able to transmit and receive a signal having a wavelength to/from said tip;

a first conducting member and a second conducting member both extending through at least a portion of said elongate member, said first conducting member being electrically coupled to said first conductive medium, and said second conducting member being electrically coupled to said second pole of said transducer;

an outer sheath having a hollow conductive member located at a distal end of said sheath, said sheath and conductive member located about an exterior of said elongate member, said sheath and said elongate member slidably relative to one another; and

a third conducting member electrically coupling an RF power supply electrically coupled to said hollow conductive member.

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30. A medical device for detecting Doppler shift and for applying energy to tissue, the medical device comprising:

an elongate member having a proximal portion and a distal portion;

a transducer means for generating a source signal and for receiving a reflected signal wherein at least a portion of said transducer means is located towards said distal portion of said elongate member;

a directing means for directing the source signal and the reflected signal, said directing means located at a distal end of said elongate member distal portion and being in acoustical communication with said transducer means,

a first conducting member and a second conducting member both extending from said proximal portion of said elongate member to said distal portion of said elongate member, said conducting members electrically coupled to at least said transducer assembly; and

an energy-conducting means for applying energy to tissue, said energy-conducting means located exterior to said transducer means and said signal directing means.

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